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Comparison of Developing Countries' Macro Performances with AHP and TOPSIS Methods

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Abstract

Study is aimed to compare the macroeconomic performances of developing countries (Turkey, Poland, Mexico, Chile, Malaysia, Hungary, Indonesia, China, Argentina and Brazil) for the period 2003-2013. In performance measurement, economic growth, inflation rate, unemployment rate and the current account balance/GDP indicators are used. AHP is used for determination the weight of criteria. Then, TOPSIS method is used for ranking the performances of developing countries. Findings show that Malaysia and the China have the best performed economies and generally they ranked either 1st or 2nd. While Turkey is ranked 5th in 2003, by year 2013 Turkey is at the last rank.

Keywords: Developing Countries, Macro Performance, AHP, TOPSIS.
JEL Classification Codes: C02, E66, O11.

Gelişmekte Olan Ülkelerin Makro Performanslarının AHP ve TOPSIS Yöntemleri ile Karşılaştırılması

Öz

Bu çalışmada gelişmekte olan ülkelerin (Türkiye, Polonya, Meksika, Şili, Malezya, Macaristan, Endonezya, Çin, Arjantin ve Brezilya) 2003-2013 yılları arasındaki makroekonomik performanslarının karşılaştırmalı olarak analiz edilmesi amaçlanmıştır. Performans ölçümünde, ekonomik büyüme, enflasyon oranı, işsizlik oranı ve cari işlemler dengesi/GSYİH kriterleri esas alınmıştır. Çalışmada öncelikle AHP yöntemi kullanılarak ağırlığı en fazla olan kriter belirlenmiş, daha sonra TOPSİS yöntemi uygulanarak gelişmekte olan ülkelerin performansları sıralanmıştır. Yapılan analizler sonucunda çalışmada yer alan ülkeler arasında en yüksek performans gösteren ülkelerin Malezya ve Çin olduğu belirlenmiştir. Türkiye ise 2003 yılında 5. sırada yer alırken, 2013 yılı itibariyle 10 ülke arasında en son sırada yer almıştır.

Anahtar Kelimeler: Gelişmekte Olan Ülkeler, Makro Performans, AHP, TOPSİS.
JEL Sınıflandırma Kodları: C02, E66, O11.

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1. Introduction

Basic indicators of improvement in an economy are macroeconomic data. Local investors can perceive economic process with macroeconomic data, foreign investors are concerned about the effective use of the resources of the country; acquire a lot of information as to the assessment of a variety of investment opportunities. In this respect, the most important criteria to compete at global level is the macroeconomic performance of the country. The development of a method to evaluate the macroeconomic performance of such a case would be useful. Indeed, an approach named as a 'magic diamond' by the OECD (1987) have been used to assess the countries' macroeconomic performances. According to this approach, there are four indicators of macro-economic performance of a country, such as unemployment rate, growth rate, inflation rate, and the current account deficit to GDP (Guran & Tosun, 2005, 90-91). The extent to which a nation's economic growth increases, that nation could have a voice on a global scale as well as compete with the other nations in different fields such as politics, economics, and military. The growth in GDP could be considered as one of the essential criteria reflecting a society's high level of welfare and improvement of international competitiveness (Kotan, 2002, 2). Unemployment is one of the most important problem for all societies regardless of the level of economic growth in a society. Poverty, which emerges from the unavailability of the right to work, which is a part of the right to live, is considered as a main indicator of unhappiness. One of the criterions that reflect the stability of the economy is named as inflation rates. Inflation, on one hand increases the cost of borrowing based on high interest rates, on the other hand, it has a negative impact on investment due to the accumulations' orientations towards unproductive fields. Especially in underdeveloped and developing countries in which there is insufficient quantity and quality of production usually gives the current account deficit. It causes, financially the country's deficit by borrowing short-term capital movements from international capital markets. This process enhances the economic fragility of countries.

Many alternative methods as well as decision methods to evaluate criteria are considered as appropriate methods for such economic comparisons. Since it is necessary to use multi-criteria framework for economic comparison and Multi-Criteria Decision-Making (MCDM) methods allow considering a variety of independent factors, these methods are determined as the most appropriate disciplines. Comparing the countries based on their economic performances could be possible with mathematical approaches that consider either variety of criteria or all those criteria (Urfalıoglu & Genc, 2013, 330).

In the study, the weights of criteria to be used in the determination of countries macro performances (economic growth, inflation rate, unemployment rate and the current account balance/GDP) will be determined by Analytic Hierarchy Process

(AHP) cover the period 2003-2013 and performance scores will be ranked by Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods. Then, the results will be compared with the performances of the other developing countries used in the current study.

2. Literature Review

In the literature, there are many studies which are comparing a country with itself by years or comparing a country with other countries. Fare et al. (1994) examined Malmquist productivity indexes of 17 OECD countries for the period 1979-1988. Findings show that Japan's productivity was the highest and U.S. productivity was superior than average. Deliktas & Balcılar (2005) examined the macroeconomic performance of 25 economies cover the period 1991-2000. They used level of technical efficiency and total factor productivity (TFP) growth of each country for evaluating the macro performances. Findings indicated a decline in the technical change in all economies, but mix of rises and falls in efficiency change showed catch-up and convergence among the economies. Guran & Tosun (2005) analyzed the macro performance of Turkey's economy for the period 1951-2003. They used four indicators (economic growth, inflation rate, unemployment rate, and current balance of payments as a percentage of gross domestic products) which were described as magic diamonds by OECD. They found that while a fairly stable performance before 1975, after 1975 an unstable structure emerged. They also emphasized that for the period 1951-1960 was the best period for Turkish economy.

Ramanathan (2006) investigated the performances of 18 MENA countries in 1999. He used DEA for the performance evaluation. Findings showed that Kuwait, Jordan, Bahrain and the United Arab Emirates were the most efficient and the Yemen is the least. Hsu et al. (2008), made a comparison in terms of efficiency between developed and less developed countries. Findings showed Indonesia and Argentina were outperforming among the all countries used. Also significant difference was found between the OECD and the non-OECD countries in the way of scale or overall technical-scale efficiency. Eleren & Karagul (2008) investigated the performance of Turkey's economy for the period 1986-2006 and they used TOPSIS method. Findings indicated that 1986, 1990, 1987, and 1993 were the best macro performance years for Turkey. Karabulut et al. (2008) examined macroeconomic performance of Turkey and European Union countries cover the period 2001- 2005. DEA and Malmquist total factor productivity index methods were used to measure technical efficiency as well as total factor productivity change. Results showed that Turkey ranked as 5^{th} in technical efficiency index. As regards to the total factor productivity, Turkey ranked as 21^{th} among the EU countries.

Dincer (2011) analyzed the EU Members and candidate countries in terms of economic activity in 2008. In performance measurement five macroeconomic

indicators (GDP, exports, imports, inflation rate, and unemployment rate) were considered and TOPSIS, Weighted Sum Approach (WSA) methods were used for the ranking. The findings showed that while Luxembourg, Netherland, and Denmark were the first three countries, Macedonia, Latvia, and Bulgaria were the last. Mangır & Erdogan (2011) examined macroeconomic performances of 6 countries (Italy, Greece, Spain, Portugal, Ireland, and Turkey) by using the TOPSIS method during the period in financial crisis. They used economic growth, inflation rate, unemployment rate, current account balance, budget, and balance rate for the performance evaluation. The findings showed economic crisis affected both Turkey and European countries.

Demireli & Ozdemir (2013) searched efficiency scores presenting the macroeconomic performances of 13 European countries which had been calculated by using the chance constrained DEA model, and then the results had been compared with the results of the deterministic DEA model. Results indicated that the efficiency scores had been increasing to the extent which the stochastic variability increased. Moreover, the number of efficient countries showed increase based on that result. It was also determined that there was statistically significant difference between the results obtained through the deterministic model and chance constrained DEA models. Urfalioglu & Genc (2013) examined the economic status of Turkey in the European Union by using MCDM methods. In this context, ELECTRE, PROMETHEE and TOPSIS methods were used in the study. Turkey's and EU member states' economic performances were compared through MCDM methods. Turkey ranked 31th in ELECTRE, 13th in TOPSIS, and 32th in PROMETHEE.

Demir & Bakirci (2014) investigated the multi-year economic efficiency of OECD countries which were measured by 6 inputs and 6 outputs by DEA during the period 2006-2010. Results showed that the lowest inputs in Iceland and the highest unemployment rate in Korea. Onder et al. (2015) evaluated the economic performances of Brazil, Turkey, India, Indonesia, and South Africa cover the period 2001-2013. ANP and TOPSIS methods were used for the outranking of countries. For the performance measurement gross domestic product, current account balance, general government gross debt, general government revenue, general government total expenditure, gross national savings, inflation (average consumer prices), population, total investment, unemployment rate, volume of exports of goods and services, volume of imports of goods and services were used. Findings showed that Turkey had the most fragile economy during great recession period (2008-2009), but afterwards the performance of Turkish economy had become relatively high. India had stable economy and generally it ranked either 1st or 2nd.

In all these studies mentioned above, performance evaluation of countries is analyzed by different MCDM methods. This study is the first paper which examines the macro performance evaluations of countries with AHP method.

3. Data and Methodology

The purpose of the study is to determine the macroeconomic performances of developing countries during the period 2003-2013. All data which are used in the study (economic growth, inflation rate, unemployment rate and the current account balance / GDP) are obtained from the websites OECD and the IMF.

The sample consists of ten developing countries which are Turkey, Poland, Mexico, Chile, Malaysia, Hungary, Indonesia, China, Argentina and Brazil. For the determination of criteria weights AHP is used and the TOPSIS method is used for the ranking of performances.

3.1. The Analytic Hierarchy Process

Saaty (1977 and 1994) presented the AHP which is a decision making method and can be used to clear up complicated decision problems. It uses a multi-level hierarchical structure of goals, criteria, sub-criteria, and options. The relevant data are estimated by using a set of pairwise comparisons. For acquiring the weights of importance in decision criteria these comparisons are used with the relevant performance measures of the options in the sense of each individual decision criteria (Triantaphyllou & Mann, 1995, 1; Tochukwu, 2014, 1). Implementation phase of the AHP approach is summarized as follows:

Step 1: The establishment of the model and problem formulation*:* All factors affecting the decision-making process in AHP which is determined by survey or consulting the opinion of the people that matter experts. After the aim, criteria, sub-criteria and options are determined to form a hierarchical structure (Yang & Lee, 1997, 246).

Step 2: Collection of data, creation of pair-wise comparison matrices*:* Saaty has developed a scale used in the pair-wise comparison of criteria. Scale of measurement in pair-wise comparison is shown in Table 1.

This scale provides decision criteria and decision options according to each criterion are evaluated on a scale of 1 to 9, with pair-wise comparisons. AHP handle with M×N matrix structure (where M is the number of options and N is the number of criteria). Relevant importance of the options in the sense of each criterion constructs this matrix (Cheng et al., 2002, 34; Triantaphyllou et al., 1998, 6).

Table 1: Scale of Measurement in Pair-Wise Comparison

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favor one over another
5	Essential or strong importance	Experience and judgment strongly favor one over another
7	Demonstrated importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	The importance of one over another affirmed on highest possible order
2, 4, 6, 8	Intermediate values	When compromise is needed

Source: Cheng & Li (2001, 34)

Step 3: Calculating relevant weights of elements on each level in the hierarchy: Before the estimation of eigenvector in the matrix, the pair-wise comparison matrix is improved, and further standardized to total 100 per cent. This is done by dividing the elements of each column of the matrix by total of column then, acquiring the eigenvector by adding the elements in each resulting row and dividing this total by the number of elements in the row (Cheng & Li, 2001, 33).

Step 4: Calculating the degree of consistency in order to validate the results: Consistency Ratio (CR) should be less than 0.1 for consistency in pair-wise comparisons. If the CR value is higher than 0.10, the problem and evaluation of the pairwise comparisons must be established again (Saaty, 1980). Also CR value approaches zero means there will be more consistent in comparison results (Zahedi, 1986; Saaty, 2001; Ramanathan, 2001).

Step 5: Use the relative weights for different purposes: For identifying key elements in only one decomposed level, the elements with higher relative weights are more important (Cheng et al., 2002, 35).

3.2. TOPSIS Method

Chen & Hwang (1992), has introduced TOPSIS method with referring to Hwang & Yoon (1981). The main goal is that the selected option should have the closest distance from the ideal solution and the farthest distance from the negative-ideal solution (Opricovic & Tzeng, 2004, 448). The TOPSIS process consists of the following steps.

Step 1: Defining goals and the evaluation criteria.

Step 2: Create Decision Matrix (A): In the first step, decision matrix is created by decision-makers.

$$\begin{bmatrix} a_{11} & a_{21} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}_{mxn} \quad (1)$$

Step 3: Calculate the Normalized Decision Matrix: The normalization of the decision matrix is made by using the following transformation (Mahmoodzadeh et al., 2007, 138).

$$r_{ji} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad (2)$$

(rij; i :1,2,….N; number of criteria j: 1,2,….k; number of alternative)

Step 4: Calculate the Weighted Normalized Decision Matrix: First, determine the relative weights of the criteria for assessment according to the purpose (ωij: i:1,2,…N). Then the elements for each column of the R are multiplied with ωij value to form V matrix. Standard weighted decision matrix is shown as Vij= ωij x Rij (Rao, 2008, 444).

$$\begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \dots & w_1 r_{1n} \\ w_1 r_{21} & w_2 r_{22} & \dots & w_2 r_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ w_1 r_{m1} & w_2 r_{m2} & \dots & w_n r_{mn} \end{bmatrix}_{mxn} \quad (3)$$

Step 5: Determine the Ideal (A^+) and Negative-Ideal (A^-) Solutions: The positive and negative ideal value sets are determined respectively, as follows; (Asadzadeh et al., 2014, 127).

$$A^+ = \left\{ \left(\max_i v_{ij} \middle| j \in J' \right), \left(\min_i v_{ij} \middle| j \in J' \right) \right\};\ A^+ = V_1^+, V_2^+, \dots, V_n^+ \quad (4)$$

$$A^- = \left\{ \left(\min_i v_{ij} \middle| j \in J' \right), \left(\max_i v_{ij} \middle| j \in J' \right) \right\};\ A^- = V_1^-, V_2^-, \dots, V_n^-$$

Step 6: Calculate the Separation Measures from the Ideal and Negative-Ideal Solution: Two Euclidean distances for each option are calculated as follows: where Si^+ and Si^- represent the distance of option A_i from the positive and negative ideal solutions, respectively (El-Santawy & Ahmed, 2003, 1061).

$$S_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2}$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}$$

Step 7: Calculate the Relative Closeness to the Ideal Solution: (Olson, 2004, 2).

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*} \qquad 0 \leq C_i^* \leq 1$$

Step 8: Rank the Preference Order

4. Findings

In the study developing countries performance scores are calculated for the period 2003-2013. Afterwards, performance comparisons are made with other developing countries.

4.1. Determining the Weight of Evaluation Criteria

In the evaluation of macroeconomic performances, there are lots of financial indicators hence evaluation results can differ as regards of using different indicators. In this study an approach named as a 'magic diamond' by the OECD (1987) have been used to evaluate the countries' macroeconomic performances. After the identification of criteria, AHP method is used for the determination of criteria weights. Four experts who are working macro economy carried out the pairwise comparison scores. Accordingly, the growth has the highest weight (0.51) taken into consideration of the four criteria. Growth is followed by current account balance/GDP (0.29), unemployment rate (0.12) and inflation rate (0.08) respectively. Consistency ratio (CR) is calculated as 0.071. The calculated value of CR is smaller than 0.10 showed the consistency of pairwise comparison.

4.2. Evaluation of Macro Performances with the TOPSIS Method

In the top row of the decision matrix weight values of each criterion are presented. Weight values are obtained through AHP method to the evaluation of surveys including pair-wise comparisons. In the study 10 decision points (countries) and 4 evaluation factors (ratios) are used. In the first step (10x4) dimensional decision matrix is constructed. Calculations for the year 2013 are given for only as an illustration in Table 2.

Table 2: Decision Matrix For 2013

Weights	**0.51**	**0.29**	**0.12**	**0.08**
Country	**Growth (%)**	**Inflation Rate (%)**	**Unemployment Rate (%)**	**Current Account Balance/GDP (%)**
Turkey	4,050	7,50	9,73	-7,94
Poland	1,550	0,90	10,33	-1,37
Mexico	1,070	3,80	4,92	-2,05
Chile	4,170	1,80	5,93	-3,42
Malaysia	4,750	2,10	3,10	3,94
Hungary	1,100	1,70	10,30	2,95
Indonesia	5,780	6,40	6,25	-3,34
China	7,700	2,60	4,10	1,93
Argentina	2,940	10,60	7,08	-0,81
Brazil	2,490	6,20	5,38	-3,61

After the decision matrix is created, normalized decision matrix is obtained by using the formula $r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}}$ and shown in Table 3.

Table 3: Normalized Decision Matrix For 2013

Country	**Growth (%)**	**Inflation Rate (%)**	**Unemployment Rate (%)**	**Current Account Balance/GDP (%)**
Turkey	0,312	0,448	0,430	-0,687
Poland	0,119	0,054	0,457	-0,119
Mexico	0,082	0,227	0,218	-0,177
Chile	0,321	0,107	0,262	-0,296
Malaysia	0,366	0,125	0,137	0,340
Hungary	0,085	0,101	0,456	0,255
Indonesia	0,445	0,382	0,276	-0,289
China	0,593	0,155	0,181	0,167
Argentina	0,226	0,633	0,313	-0,070
Brazil	0,192	0,370	0,238	-0,312

The normalized values are multiplied by weights (Vij = ωij x Rij) were obtained weighted normalized decision matrix is shown in Table 4.

Table 4: Weighted Normalized Decision Matrix For 2013

Country	Growth	Inflation Rate	Unemployment Rate	Current Account Balance/GDP
Turkey	0,159	0,035	0,051	-0,199
Poland	0,060	0,004	0,054	-0,034
Mexico	0,042	0,018	0,026	-0,051
Chile	0,163	0,008	0,031	-0,085
Malaysia	0,186	0,010	0,016	0,098
Hungary	0,043	0,008	0,054	0,074
Indonesia	0,226	0,030	0,033	-0,083
China	0,302	0,012	0,021	0,048
Argentina	0,115	0,050	0,037	-0,020
Brazil	0,097	0,029	0,028	-0,090

Then positive ideal (A^+) and negative ideal (A^-) solutions have been calculated. Maximum value in each column of the matrix V is selected for A^+ set; and minimum value in each column of the matrix V is selected for A^- set. Sets, serve the purpose according to the progress of the criterion is computed as follows.

$$A^+ = \{0,302;\ 0,004;\ 0,016;\ 0,098\}$$

$$A^- = \{0,042;\ 0,050;\ 0,054;\ -0,199\}$$

For the each country the separation measures from the ideal (Si^+) and negative-ideal solution (S_i^-) are calculated. Relative closeness to the ideal solution (C_i^+) is calculated with using the formula in step 7.

Performance scores of countries by years are shown in Figure 1. The scores generally follow a descending trend during the period 2003-2008 for Turkey and Malaysia, 2004-2009 for Mexico, 2003-2007 for Hungary, 2003-2006 for Indonesia, 2006-2010 for China, 2003-2006 for Argentina, 2003-2005 and 2010-2013 for Brazil. The most intensive era of the financial crisis for the period 2008-2009, performance score of Turkey, Mexico, Chile, Malaysia and Hungary declined to its lowest levels for the discussion period. These findings show that countries are affected from great recession.

Also the scores follow an increasing trend during the period 2010-2013 for Poland, 2007-2013 for Hungary, 2008-2011 for Argentina and 2006-2010 for Brazil. During 2010-2013 periods, a re-descending trend in the performance scores is continued for Turkey and Brazil. These results indicated that structural reforms need to be done in Turkey and Brazil.

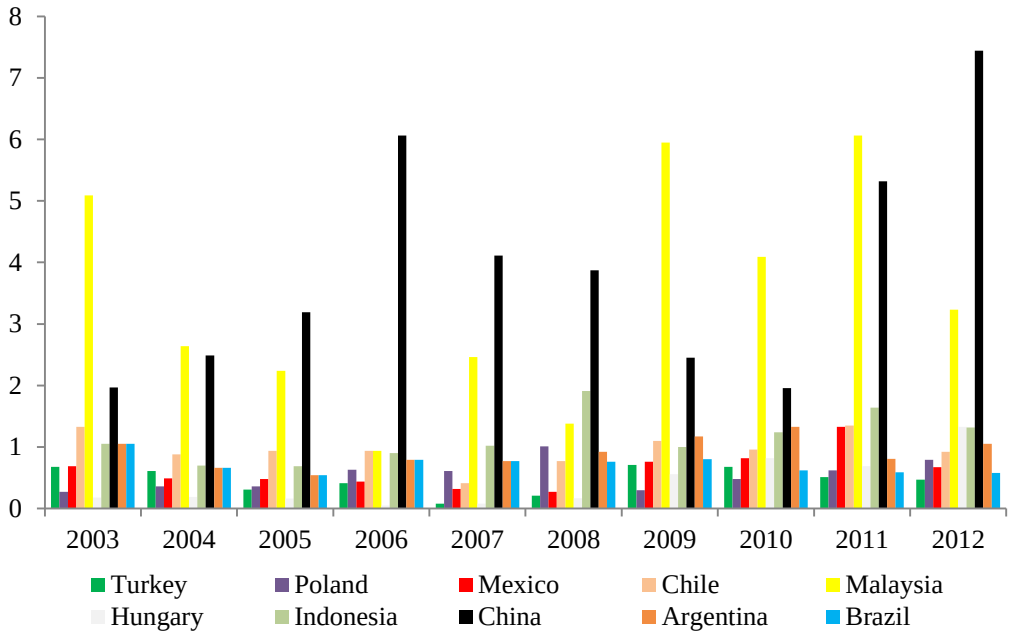

Figure 1: Performance Scores of Countries by Years

Table 5 reports the scores and rankings of developing countries in the study cover the period 2003-2013.

As can be seen from the Table 5, Malaysia, Argentina and China have the highest performance scores in 2003 and the Hungary was rated as the least performing economy out of all countries. In 2004, Malaysia, China, and Chile were the first three countries; Hungary, Poland, and Turkey were the last three ones. 2006, 2007 and 2008, China surpassed Malaysia and ranked as 1st. During the period 2006-2007 Argentina and in 2008 Indonesia ranked as 3rd. Hungary had the most underperformance economy during the 2006-2008 period. In 2009, China, Indonesia and Malaysia were outperforming among all countries included and the Hungary is the most underperformer. Malaysia passed China and ranked as 1st during the period 2010-2012. Argentina, Argentina and Indonesia ranked as 3rd places respectively in the three years (2010-2011-2012) period. In 2013 China, Malaysia, and Hungary were the first three countries, Turkey, Brazil, and Mexico were the last three ones.

Hungary has not the worst performance for each year but generally its rank is at low levels until 2013, on the other hand in 2013 this country has increased its macroeconomic performance. Meanwhile Brazil has average performance until 2011; as of 2011 its scores are decreased and ranked as 9th in the last 3 years.

Table 5: Scores (S) and Rankings (R) of Developing Countries

	2003		2004		2005		2006		2007		2008	
Country	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**
Turkey	0,68	5	0,68	8	0,61	7	0,31	9	0,41	9	0,08	9
Poland	0,57	8	0,27	9	0,36	9	0,36	8	0,63	7	0,61	6
Mexico	0,56	9	0,69	7	0,49	8	0,48	7	0,44	8	0,32	8
Chile	0,65	6	1,33	3	0,88	4	0,94	4	0,94	4	0,41	7
Malaysia	3,54	1	5,09	1	2,64	1	2,24	2	2,16	2	2,46	2
Hungary	0,37	10	0,18	10	0,19	10	0,16	10	0,05	10	0,08	10
Indonesia	1,31	4	1,05	5	0,70	5	0,69	5	0,90	5	1,02	3
China	2,28	3	1,97	2	2,49	2	3,19	1	6,06	1	4,11	1
Argentina	2,74	2	1,27	4	1,26	3	0,99	3	1,18	3	0,61	5
Brazil	0,64	7	1,05	6	0,66	6	0,54	6	0,79	6	0,77	4

	2009		2010		2011		2012		2013	
Country	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**
Turkey	0,21	9	0,71	8	0,68	8	0,51	10	0,47	10
Poland	1,01	4	0,30	10	0,48	10	0,62	8	0,79	7
Mexico	0,27	8	0,76	7	0,82	6	1,33	5	0,67	8
Chile	0,77	7	1,10	4	0,96	5	1,35	4	0,92	6
Malaysia	1,38	3	5,95	1	4,09	1	6,06	1	3,23	2
Hungary	0,17	10	0,56	9	0,82	7	0,69	7	1,33	3
Indonesia	1,91	2	1,00	5	1,24	4	1,64	3	1,32	4
China	3,87	1	2,45	2	1,96	2	5,32	2	7,44	1
Argentina	0,92	5	1,17	3	1,33	3	0,81	6	1,05	5
Brazil	0,76	6	0,80	6	0,62	9	0,59	9	0,58	9

5. Conclusion

In the study, macroeconomic performances of developing countries are analyzed for the period 2003-2013. Firstly the criteria used to measure the macroeconomic performance of the country which has been identified. After that, it is determined the weight of the criteria using AHP approach. The economic growth (0.51) is determined as the most important criterion for measuring the macro performance of the developing countries. Economic growth is followed by the current account balance/GDP (0.29), unemployment rate (0.12) and inflation rate (0.08) respectively. Then TOPSIS method is used for evaluating ten developing countries' macroeconomic performance, it is used for the determination of which country has the highest and lowest performance as proportional.

The findings show that Malaysia and China have the highest performance among the countries they generally ranked either 1st or 2nd. While Turkey is ranked 5th in 2003, as of 2012, Turkey is rated as the least.

Adopting the policies like directing sources to sectors which can produce more added values and promoting these sectors; allocating resources to necessary training expenditures will increase labor productivity; giving importance to human capital, technology policy, R&D and energy are indispensable necessity for Turkey.

There are some limitations of the study. Due to the difficulty in reaching the data, study is limited to only ten developing countries. They are also used different performance evaluation criteria in the literature. When different indicators (e.g. general government gross debt, general government revenue) are used, it is likely to change the performance scores.

When the study is dealt in the scope of this sample that can be advisor about governments' dwelling on which criteria for increasing countries' performance and which country will be the subject of pattern. In the following studies more countries, more criteria or different multi-criteria decision-making method can be used and therefore the study can be improved.

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